Page 1, line 7.

The present invention is directed to a ~~microprocessor based~~ microprocessor-based system for use in a vehicle for controlling the operation of various auxiliary devices, such as wheelchair lifts, lift gates, personal lifts, or any other device that requires activation with the vehicle in a secure position.

Page 1, line 11.

In the last several years, we have witnessed the increased use of various auxiliary lift devices, such as wheelchair lifts, lift gates and personal lifts, which are used to allow persons with disabilities or other infirmities to more easily enter and exit vehicles (such as buses, vans and sport utility vehicles (SUV's)). As can be appreciated, when such devices are used, it is important that the vehicle be prevented from moving during the operation of the auxiliary device, insofar as movement of the vehicle can result in injury to the user. Consequently, the ~~American~~ Americans with Disabilities Act (ADA), Title 49, Coder of Federal Regulations, has implemented various lift interlock requirements to ensure that vehicles will not operate when lift devices are employed.

Page 1, line 19.

United States Patent Nos. 4,420,286, issued to Hanson et al., and 5,052,879, issued to Wolfe et al., acknowledge that an interlock device used in conjunction with a wheelchair lift, or an invalid lift, must or should be used. For example, Hanson et al.

~~deseribes~~ describe an invalid lift apparatus including an interlock switch 186. According to Hanson et al., after the driver brings the vehicle to a stop, the gear shift lever must be placed in the "park" position to close the interlock switch 186, for the invalid lift apparatus to operate.

Page 2, line 8.

The Wolfe et al. patent is directed to a wheelchair lift and transfer system, and references a "park" cutoff switch 4 (in Figure 18). The Wolfe et al. system also does not lock the vehicle in "park" when the lift door is open, or when the parking brake is employed, nor does the system incorporate system diagnostics and diagnostic displays.

Page 2, line 13.

The deficiencies of the prior art are addressed by the present invention which is directed to an intelligent lift interlock system used to prevent a vehicle from being moved when ~~a~~ an auxiliary device is operated. The auxiliary device used in the present system may include a wheelchair lift, a lift gate, a personal lift, or any other device that requires activation with the vehicle in a secure position. The present invention preferably provides the option of activating or deactivating an auxiliary device only when the vehicle is in ~~part~~ park. For instance, the system can be adapted so that an electrically controlled front door can only be activated when the vehicle is in park.

Page 2, line 21.

The present invention preferably includes a microprocessor controller for operating the auxiliary device based on transmitting the status of various sensors to the microprocessor. The lift interlock system, including the microprocessor, can be installed in the vehicle as original equipment or can be added at a later time. In this respect, the present invention is preferably designed to use sensors that are already on the vehicle by connecting them to OEM connectors for an easy "plug and play" installation. No cutting of OEM harnesses would be required. The present invention also preferably includes a module having diagnostic display and diagnostic capabilities, as well as a dedicated park output which can drive a relay, a lamp, a buzzer, or any other external device when the vehicle is in park.

Page 3, line 7.

Since the present invention is designed to prevent or reduce injuries associated with allowing various people with disabilities and/or infirmities to exit or enter the vehicle, the auxiliary device should only operate when all of the following conditions are met: 1) ~~the~~ The vehicle is in park; 2) ~~the~~ The parking brake is applied; 3) ~~the~~ The vehicle's ignition is on; 4) ~~the~~ The lift power switch is engaged; and 5) ~~the~~ The lift door is open. Although the microprocessor utilized in the present invention can allow the operation of the lift device to be activated when one or fewer than all of the ~~above-noted~~ above-

noted conditions are met, for safety reasons, the vehicle lift is preferably operated only when all of these conditions are met. Additionally, the present invention is preferably designed to prevent the vehicle from being shifted out of "park" if the lift door is open, or when the parking brake is applied.

Page 3, line 17.

Furthermore, the present invention preferably operates to prevent the vehicle from being shifted out of "park" ~~anytime~~ whenever the parking brake is applied. This feature will eliminate excessive parking brake wear which can occur if the parking brake is inadvertently engaged while driving.

Page 4, line 1.

FIGURE 2 is a circuit diagram of the ~~microprocessor controlled~~ microprocessor-controlled lift interlock module.

Page 4, line 17.

Figure 2 shows a circuit diagram of the present invention including the reference numerals associated with the various inputs and outputs of microprocessor 1, as described above with respect to Figure 1. As previously discussed, many of the sensors utilized by the present invention are directly connected to the microprocessor 1 utilizing, for example, an OEM connector 21. Power to operate the microprocessor controller is preferably provided by the vehicle's battery. A standard twelve volt battery can be connected through capacitors C1 and C2 to a ~~step down~~ step-down voltage regulator 22 for dropping the twelve volts to five

volts. Capacitor C1 is preferably provided to buffer short power drops without circuit recess. A diode 23 is preferably used for reverse polarity protection. The five volts produced by the ~~step down~~ step-down regulator 22 are preferably provided to the microprocessor 1 at pin 1. This also preferably indicates that the ignition is on. Although it is indicated that a standard twelve volt power source is utilized, it is noted that the vehicle can be powered by other voltage sources, typically between eleven and fourteen volts, although voltages as high as sixteen volts are possible. Regardless of the source of the power, the ~~step-down~~ step-down regulator 22 reduces the voltage to a manageable level, such as five volts, to be introduced to the microprocessor 1. A ground circuit is preferably included and connected to pin 14 providing ground through the vehicle's chassis.

Page 8, line 14.

Pins 6, 7, 8, 9 and 10 are preferably used to provide outputs from the microprocessor 1 to a status display board 2, provided on or close to the vehicle's dashboard. These signals are preferably used to indicate the status of various devices used in the lift interlock system. This system preferably operates only when the following conditions are met: ~~the~~ The vehicle is in park, the parking brake is engaged, the vehicle ignition is on, the lift power switch is on, and the lift door is open. Since the vehicle's battery provides power to the interlock, operating this system with the ignition on could lead to a low battery voltage

condition, i.e., if the interlock system is operated for a long time while the vehicle is parked. Once the microprocessor recognizes the existence of all of these signals (or in some instances a combination ~~the~~ of these signals), relay 35, via pin 5, is preferably engaged through transistor 36 and the lift or similar device preferably begins to operate. This circuit is preferably protected for inductive voltage spikes from the relay coil 35 by a diode 37. This switching system can be connected to either power or ground depending upon the type of switching desired by the user. If all of the parameters for the lift have been met, a lift power LED 16 is preferably illuminated using a five voltage supply and by grounding the circuit. A 220 ohm resistor is preferably used to limit the current to the LED.

Page 10, line 11.

As can be appreciated, the signal lights 16, 17, 18, 19 and 20 have been described as being LEDs. It can be appreciated that this type of signal indication can be varied as well as the colors produced by the illumination devices. The microprocessor of the present invention can perform ~~self-diagnostics~~ self-diagnostics every time the vehicle is started. This is true since each of the aforementioned LEDs will be momentarily illuminated when the vehicle's ignition is initially turned on. The LEDs would then be turned off at a predetermined time after the initial engagement, such as one second. The use of the dash mounted LED

panel displays could also be utilized as a device for diagnosing problems of the present invention.